Title: Collapsible container from plastic and method and mold for the manufacture thereof.

The invention relates to a collapsible container. In particular, the invention relates to a collapsible container provided with a bottom and sidewalls, whose sidewalls are pivotally connected to the bottom.

For packaging products, box-shaped containers of the set-up box type or the ready-for-use-carton type are used. These containers have the drawback that, prior to use, they are to be folded and glued together. Moreover, the options for use for cardboard boxes are limited, for instance in that the cardboard has poor moisture resistance. It is true that it is known to coat cardboard with a moisture resistant layer, preferably on both sides, but, as a result, the cardboard becomes relatively expensive. Moreover, this has as a drawback that the cardboard is no longer a mono-material and therefore leads to waste disposal problems.

Further, it is known to manufacture containers such as boxes or bottles in one piece, for instance from plastic or glass. However, this has as a drawback that the manufacture may be expensive and that the containers take up relatively much space in empty condition, both prior to and after use.

It is further known to manufacture plastic containers such as folding crates, the sidewalls of which are pivotable relative to the bottom such that the sidewalls can be pivoted against the bottom or against each other, so that the volume of the containers can be considerably reduced. Four sidewalls are then manufactured separately and intercoupled with the aid of a frame or the like, while the frame is connected to the bottom. Such containers are expensive and vulnerable as a result of the many parts. Further, such containers also have the drawback that they are limitedly usable, in particular also in that the parts are manufactured separately and coupled, so that the containers are not liquid-tight. This also holds if the walls are pivotally connected to the bottom but are to be intercoupled when folding out the container, which couplings are

to be detached when folding the container in again. Moreover, due to the coupling means, such containers are vulnerable.

The invention contemplates a collapsible container of the above-mentioned type, wherein disadvantages of the known containers are obviated while maintaining the advantages. To that end, a container according to the invention is characterized by the features of claim 1.

In a container according to the invention, sidewalls of the container are pivotally connected to the bottom, while, moreover, the sidewalls are also mutually pivotally connected. In at least two sidewalls, means are provided such that these are at least partly foldable. As a result, the sidewalls can be pivoted in the direction of or even virtually against the bottom without the sidewalls having to be detached from each other. The containers can be manufactured in one piece and in one go so that further assembly operations can be dispensed with. Moreover, as the sidewalls and the bottom are mutually pivotally connected, folding out is possible in a particularly simple manner. Further, such containers can be designed to be liquid-tight and even gas-tight in a simple manner, so that virtually universal applicability is obtained.

Containers according to the invention can be manufactured in different sizes, with different folding mechanisms, depending on, inter alia, the desired ratios between width, length and height, desired fields of application, goods to be packaged and the like.

In a first further elaboration, a collapsible container according to the invention is further characterized by the features of claim 3.

In such an embodiment, in opposite first sidewalls triangular wall surfaces are bounded by hinging elements such that the respective sidewalls are somewhat foldable, so that, in a particularly simple manner, the desired collapsibility is obtained.

In a further more detailed embodiment, a collapsible container according to the invention is further characterized by the features of claim 4.

By providing the recited fourth hinging elements and fifth hinging elements, the advantage is achieved that not only the sidewalls of a container according to the invention can be pivoted in the direction of the bottom, but also, that the bottom can be folded, thereby yielding an even more compact folded-together condition.

If, in each first sidewall a first and a second wall surface are defined as further described in claim 5, it is preferred that the first wall surface be an equilateral triangle. With it, a sidewall extending in folded-out condition approximately at right angles to the bottom can simply be pivoted to a position against the bottom. In more general sense, it is preferred that the hypotenuse of this triangle, i.e. the or each third hinging element, be provided at an angle such that the sidewalls can be folded approximately flat against each other and/or the bottom. The second wall surface can then also be a substantially equilateral triangle, for instance when the height of at least the second sidewall is approximately equal to or smaller than half the width of the bottom, while the second wall surface can also be trapezoidal and extends to a point at a relatively large distance from the bottom. In such an embodiment, it is preferred that, as described earlier, the bottom be foldable about the fifth hinging element so that a relatively high container with a height which is greater than the length and/or half the width of the bottom can be folded so as to be flat.

Further, it is preferred that in the bottom adjacent the or each fifth hinging element, sixth hinging elements be provided, extending from angular points of the bottom and intersecting approximately on a line defined by the or each fifth hinging element, the arrangement being such that triangular bottom surfaces are thereby enclosed, preferably of a substantially equilateral triangular shape, at least with a hypotenuse dividing the respective angle of the bottom approximately in two, thus yielding a particularly compact manner of folding.

With a collapsible container according to the invention, the hinging elements are preferably of liquid-tight and/or gas-tight design, for instance as integrated living hinges or film hinges, which can be integrally injection molded in the same plastic, or can be inserted as inserts and are at least partly enveloped by the plastic of the bottom and/or sidewalls. As a result, particularly suitable containers can be obtained in which many different sorts of products can be packaged.

In a preferred embodiment, the outside of the container, at least in folded-out condition, is smooth, in particular at the location of the hinging elements. Thus, the advantage is achieved that a particularly attractive finish is obtained and that, moreover, the possibility is afforded to provide the containers in a simple manner at the outside with prints, film finish layers or the like, in particular through the use of in-mould-labeling techniques. Conversely, in an alternative embodiment, the inside of the container is relatively smooth, so that contamination can be prevented and cleaning, for instance sterilization, is possible in a simple manner.

With a collapsible container according to the invention, the bottom can simply ascend somewhat towards the center, for instance as indicated in claim 18, such that a larger bearing capacity is obtained than with a flat bottom. If load is placed in the container on the bottom, this will be slightly forced in the direction of a flat condition, so that a part of the bearing capacity is offered by the sidewalls and/or first hinging elements. Moreover, thus, focused folding-in can be further improved. On both sides of a fifth hinging element or sixth hinging elements in the bottom, projections, ridges or the like can be provided in a simple manner which, in folded-out condition, abut each other for further increasing the load bearing capacity.

The invention further relates to a mold for manufacturing a collapsible container, characterized by the features of claim 19. With such a mold, through injection molding, easily and readily, one-piece collapsible containers can be manufactured which emerge from the mold in substantially folded-out

condition They are virtually directly ready for use. In principle, assembly operations are not necessary.

The invention further relates to a method for forming collapsible containers, characterized by the features of claim 21.

Such a method offers the advantage that, in principle, without assembly operations, foldable containers can be obtained which have a particularly large area of applicability. With such a method, containers of all sorts and sizes can be manufactured which can be folded so as to be particularly compact.

Further advantageous embodiments of a container, mold and method according to the invention are given in the subclaims. In clarification of the invention, exemplary embodiments will be further elucidated with reference to the drawing. In the drawing:

Fig. 1 shows a container according to the invention in perspective view;

Fig. 2 shows a part of a container according to Fig. 1 during a folding-in or folding-out movement;

Fig. 3 shows a container according to Figs. 1 and 2, in folded-in condition;

Fig. 4 shows a container according to the invention in a first alternative embodiment;

Fig. 5 shows, in side view, a container according to Fig. 4 in folded-in condition;

Fig. 6 shows a third embodiment of a container according to the invention, in folded-out condition comparable to Figs 1 and 4;

Fig. 7 shows the container according to Fig. 6, in partly folded-in or folded-out condition;

Fig. 8 shows a container according to Figs. 6 and 7 in virtually completely folded-in condition;

Fig. 9 shows, in side view, a part of a container according to Figs. 6 - 8;

Fig. 10 shows a container according to Fig. 6 in partly folded-in or folded-out condition, in a second manner of folding;

Fig. 11 shows the container according to Fig. 10, in partial side view, in folded-in condition;

Fig. 12 shows, in top plan view, a bottom of a container according to Figs. 6 – 11;

Fig. 13 shows, in side view, a wall of a container according to the invention, in particular according to Figs. 6 – 11, in relatively low design with ascending bottom;

Fig. 14 shows, in side view, comparable to Fig. 13, a container according to the invention, with relatively high sidewalls;

Fig. 15 shows a container according to the invention with dividing wall;

Fig. 16 shows a container according to the invention with relatively low sidewalls;

Figs. 17 and 18 schematically show, in cross-sectional view, pivoting means for a container according to the invention;

Figs. 19 – 21 schematically show, in cross-sectional side view, a mold according to the invention, in three consecutive steps in the manufacture of such a container; and

Figs. 22 – 24 show, somewhat enlarged, a detail of a mold according to the invention in an alternative embodiment.

In this description and the drawings, exemplary embodiments of the invention are represented which should not be taken as being limitative in any way. The invention is described on the basis of a substantially rectangular container, at least a container with a rectangular bottom surface. Naturally, this can also be quadrangular, while, moreover, multiangular bottom surfaces can be used, for instance hexagonal, octagonal or dodecagonal surfaces, without departing from inventive concept. The containers included in this description are all, according to the invention, formed in one piece through injection molding, while, however, prior to insertion into the mold, plastic inserts can be inserted, such as films for in-mold-labeling, films or such

elements for forming film hinges, fastening means and the like, which are fixedly incorporated in the container by melting and/or enveloping through injection-molding.

In the exemplary embodiments shown, each time, substantially rectangular, box-shaped containers are shown, open to one side. However, it will be clear that, in a simple manner, other types of containers can be formed, while, moreover, lids can be provided for closure of the open sides mentioned. A lid can for instance be connected via a further integrated hinge to one of the sidewalls, in particular a non-foldable sidewall and can be designed so as to be easily collapsible, for instance in a manner comparable to that of the containers shown. Also, the container and lid can be manufactured separately, both designed as the containers shown in the Figures, such that a container serving as a lid can be slid upside-down over the container serving as a receiving means. If desired, handle bars, grips, points of engagement, windows, insertion compartments and the like can be formed so as to be integrated therein on sidewalls and/or the bottom of a container according to the invention, for instance for enhancing the portability, rigidity, identification or the like.

Fig. 1 shows a container 1 according to the invention, provided with a bottom 2, two first sidewalls 4 and two sidewalls 6 extending at right angles thereto. The first and second sidewalls 4, 6 are connected by integrated first hinging elements 8 to the longitudinal edges of the bottom 2 while, each time, a first sidewall 4 is connected to a second sidewall 6 via a second hinging element 10, also integrated. In the first sidewalls 4, third hinging elements 12 are provided which define folding lines including an angle α (with folded-out container 1) with the second hinging elements 10, for instance 45 degrees. The second hinging elements 12 reach from near an angular point 14 of the bottom 2 to a point near the middle 16 of the top longitudinal edge 18 of the respective first sidewall 4. In the exemplary embodiment shown, the height H1 of the sidewalls 4, 5 is equal to approximately half the width b of the bottom 2, which

corresponds to the length of the first sidewall 4. Thus, the third hinging lines 12 divide the first sidewall 4 into a first triangular sidewall surface 20 and two second triangular sidewall surfaces 22 located on the opposite side of the third hinging means 12. The second sidewalls 6 are rectangular and cannot be folded together in the exemplary embodiment shown.

The first, second and third hinging means 8, 10, 12 are designed such that the centers 16 for folding-in the container 1 can be pushed towards each other, while they are automatically forced in the direction of the bottom 2. In Fig. 2, a part of a container 1 is shown, cross-sectioned along a plane through the centers 16 and the center of the bottom 2. It is clear that here, the center 16 of the respective first sidewall 4 is forced in the direction of the bottom 2, while a perpendicular bisector 24 through the center 16 is pivoted on the bottom 2 such that, with the container in collapsed condition as shown in Fig. 3, it extends along the axial line 26 of the bottom 2. The third hinging element 12 ends up resting diagonally on the bottom 2 while the second hinging element 10 ends up lying parallel to the first hinging means 8 of the first sidewall 4. Fig. 3 shows the container 1 according to Fig. 1 in folded-in condition, while the third hinging elements 12 are shown in broken lines.

In the embodiment shown in Fig. 1, the hinging means are designed such that the outsides of the container 1 can be designed so as to be virtually flat, so that they are hygienic and offer an attractive exterior. Moreover, thus, the advantage is achieved that the outside of the container can be finished in a simple manner, for instance through printing or, preferably, through the use of in-mold-labeling techniques. With these, both the exterior and the barrier properties of the container can be improved, cleanability can be enhanced and like advantages can be achieved.

In Fig. 4, a container 1 is shown in a first alternative embodiment, which substantially corresponds to the one shown in Fig. 1. However, in this embodiment, along each perpendicular bisector 24 through the center 16 in each first sidewall 4, a fourth hinging element 26 is provided, so that two first

sidewall surfaces 20 are obtained, on opposite sides of said fourth hinging element 26, below the third hinging elements 12. Again, two second sidewall surfaces 22 lie above the third hinging elements 12. In the bottom 2, along the axial line 26, a fifth hinging element 28 is provided, interconnecting the two fourth hinging elements 26. In the embodiment shown in Fig. 4, each fourth hinging element 26 is of relatively wide design or designed as two hinging elements placed at a short distance from each other. In this embodiment, the container 1 can be folded as represented in Figs. 2 and 3, whereupon, however, the folded-in container can be folded double from a condition as shown in Fig. 3 along the fifth hinging element 28 and the two fourth hinging elements 26 to a condition as shown in Fig. 5, so that an even more compact folded-in condition is obtained. The fourth hinging elements 26 are then folded over the fifth hinging element 28. It will be clear that it is also possible to fold a container 1 according to Fig. 4 from a position as shown in Fig. 3 such that the second sidewalls 6 come to abut against each other, while preferably, the fifth hinging element 28 in the bottom is designed to be relatively wide or with two parallel hinging lines located relatively close together, while the height of the sidewalls 4, 6 is chosen to be somewhat smaller than half the width of the bottom 2. With such an embodiment, the inside space of the container 1 in folded-in condition is even better protected from outside influences.

Fig. 6 shows a third embodiment of a container 1 according to the invention, again provided with a bottom 2 and first and second sidewalls 4,6 connected thereto via first hinging elements 8. Again, the height of the sidewalls 4, 6 is approximately equal to half the width of the bottom 2. In this embodiment, again, second hinging elements 10 are provided as well as fourth hinging elements 26 and a fifth hinging element 28, all as described with reference to Fig. 4. However, in this embodiment, third hinging elements 12 extend diagonally from a top angular point 30 between a first and second sidewall 4, 6 and the center 32 of the first hinging element 8 connecting the respective first sidewall 4 to the bottom 2. Again, the second hinging elements

10 and third hinging element 12 include an angle α of, for instance, approximately 45 degrees. As shown in more detail in Fig. 12, in the bottom 2, four sixth hinging elements 34 are provided. Each sixth hinging element 34 reaches from a corner 14 of the bottom 2 to an intersection 36 on the axial line 28, at least the respective fifth hinging element 28. In the embodiment shown in Figs. 6 and 12, two intersections 36 are provided, at a mutual distance d, while, each time, a part of the fifth hinging element 28, a first hinging element 8 and a sixth hinging element 36 enclose a bottom wall surface 38 having approximately the same shape and size as the first sidewall surfaces 20.

A container 1 according to Fig. 6 can be folded-in in two different manners, represented in Fig. 7 – 9 and Fig. 10 – 11, respectively. The manner of folding-in substantially depends on the third hinging elements 12 being present or not and the design thereof. If the third hinging elements 12 are omitted or are designed such that the second sidewall surfaces 22 can only fold towards the inside space of the container 1 along the third hinging elements 12, the container 1 will fold in as shown in Figs. 7 – 9 while, when the second sidewall surfaces 22 can only fold outwards along the third hinging elements 12, the container 1 will fold in as shown in Figs. 10 and 11. In both embodiments, folding-in the container 1 can be easily initiated, for instance by moving the centers 16 of the top longitudinal edges 18 of the first sidewalls 4 in the suitable direction towards or away from each other, respectively, but folding-in can also be initiated by moving the part of the fifth hinging element 28 between the two intersections 36 upward, i.e., in the direction of the inside space of the container 1.

In Fig. 7, a partly folded-in container according to Fig. 6 is shown, where it is clear that the fifth hinging element 28 is moved upwards between the two intersections 36, while the centers 16 move towards each other such that the top longitudinal edges 19 of the second sidewalls 6 are pulled together. The bottom wall surfaces 38 will then be at an inclination. Upon further upward movement of this part of the fifth hinging element 28, the perpendicular

bisectors 24, at least the fourth hinging elements 26, are moved towards each other approximately parallel. The same holds substantially for the second sidewalls 6. Upon still further movement of this portion of the fifth hinging element 28, the insides of the second sidewalls 6 are moved against the second bottom surface parts 40 located on opposite sides of the fifth hinging element 28 between the sixth hinging elements 34, while the outsides of the first sidewall surfaces 20 and the second sidewall surfaces 22 are moved against each other, while the insides of the first bottom surfaces 38 are moved against the inside of the first sidewall surfaces 20. Therefore, with the container 1 folded-in, the fifth hinging elements 28 extend parallel to the third hinging elements 12, if present, while the fourth hinging element 16 extends at right angles to the first hinging elements 8.

A container 1 according to Fig. 6, with a manner of folding according to Figs. 7 – 9, offers the advantage that the sidewalls 4, 6 can be designed to be relatively high, for instance as shown in Fig. 14. In this embodiment, the first sidewall surfaces 20 have a triangular shape, in particular approximately an equilateral triangle with angles of approximately 45 degrees. The second sidewall surfaces 22 are then substantially trapezoidal. It will be clear that the sidewalls 4, 6 can also have different shapes and, for instance, can incline inwards and/or outwards, while the position of the hinging elements, and hence of at least the triangular sidewall surfaces 20, is modified.

In Fig. 14, in interrupted lines, two alternative seventh folding lines 42 are shown, extending from the center 16 of the top longitudinal edge 18, in an inclining manner, as far as the second hinging element 10. In the second sidewall 6, eighth hinging elements 44 are provided, connecting two seventh hinging elements 42. As a result, the wall parts of the second sidewall 6 extending above the eighth hinging elements 44 can be folded-in as a lid, the first sidewall 4 folding inwards along the ninth folding line 46. Thus, a one-piece, completely closeable container 1 can be obtained.

In Fig. 10, the earlier mentioned alternative manner of folding for a container 1 according to Fig. 6 is shown, in which the centers 16 of the top longitudinal edges 18 of the first sidewalls 4 are pushed away outwards while the part of the fifth hinging element 28 extending between the intersections 36 is pushed upwards for folding together the bottom 2. In this embodiment, the second sidewalls 6 pivot towards each other while the centers 16 are moved downwards and outwards to a point where they end up lying between two angular points 14, with the first and second sidewall surfaces 20, 22 abutting against each other by their outsides while the insides of the second sidewall surfaces 22 abut against each other. Thus, a flatly folded-in container is obtained. In Fig. 11, in side view, a part of a container 1 according to Fig. 10 is shown, in folded-together condition with, therein, in interrupted lines the different hinging elements.

In Fig. 13, schematically, in side view, a container 1 according to Fig. 6 is shown, with modified bottom 2. In this embodiment, the bottom 2 is dimensioned such that the part of the fifth hinging element 28 located between the intersections 36 lies somewhat higher than the centers 32. The first and second bottom surfaces 38, 40 are then at a slight inclination. Due to such a configuration of the bottom, which can, for instance, be substantially pyramidal, the load bearing capacity is enhanced. The fact is that then, the fifth hinging element 28 will want to push downwards, so that a large part of the force is guided away sideways by the bottom surfaces 38, 40. On both sides of the fifth hinging element 28, projections, ridges or the like can be integrated by injection-molding which, with the container in folded-out condition, abut against each other, to further increase the bearing capacity.

In Fig. 15, a container 1 according to the invention is shown in a further alternative embodiment, which container 1, as to structure, substantially corresponds to that of Fig. 6. The same parts have the same reference numerals. In this embodiment, a dividing wall 46 is provided, which extends between the two second sidewalls 6. Via ninth hinging elements 48, the

dividing wall is connected to the second sidewalls 6, via tenth hinging elements 50 to the bottom surfaces 40, and is provided in the center with a tenth hinging element 52, parallel to the fourth hinging elements 26, at right angles to the fifth hinging element 28. From the intersection between the eighth and ninth hinge line on the first hinge line 8, on both sides of the tenth hinging element 52, an eleventh hinging element 54 extends as far as the end of the tenth hinging element 52 remote from the bottom. When folding-in the container 1 as described earlier with reference to Figs. 6 – 11, the dividing wall 46 folds in such that the tenth hinging element 52 rests on the fifth hinging element 28, while the triangles 56 located on opposite sides of the eleventh hinging elements 54 are folded against each other and will come to rest on the bottom surface 40.

In Fig. 16, a further alternative embodiment of a container 1 according to the invention is shown, again comparable to a container according to Fig. 6, wherein, however, in the sidewall 4 three fourth hinging elements 26 are provided, parallel to each other and to the second hinging elements 10, while, each time, between a second hinge line 10 and a fourth hinge line 26 or between two second hinge lines 26, respectively, third hinging elements 12 are provided, forming first and second sidewall surfaces 20, 22. The third hinging elements 12 form a corrugated profile. In the bottom 2, three fifth folding lines 28 are provided parallel to each other, and four sixth folding lines 34, enclosing four first bottom surfaces 38. The container 1 according to Fig. 16 can be compared to two containers according to Fig. 6 arranged next to each other, while the second sidewalls 6, abutting in such a construction, are omitted. Such a container can be folded together in a comparable manner, the middle fifth hinging element 28 remaining in its place and the two sidewalls 6 being moved towards each other in that the two remaining fifth hinging elements 28 are moved upwards, resulting in the earlier described collapse. It will be clear that in a comparable manner, also wider, low containers can be designed.

In Fig. 17, schematically in cross-sectioned view, a hinging element according to the invention is shown, here, for instance, a hinging element 12.

In Fig. 18, a film hinge is shown, wherein between two wall parts a relatively flexible strip b is included, which, for instance, has been laid in a mold as an insert, and injection molded at both sides, in Fig. 18 shown as molded-in in end edges c of a substantially circular cross-section. In this embodiment, the wall parts 1 can be pivoted to a position extending substantially parallel, whereby the end edges c are rolled along the film b, such that pivoting is possible in a simple manner and a relatively pivoted-in position is obtained. Preferably, the end edges c abut against each other when the wall parts a extend approximately parallel to each other, so that an even better confinement is obtained. Naturally, the end edges c can also have any other suitable shape and the strip b can also be attached in a different manner or, optionally, be integrally injection-molded.

In Figs. 19 – 21, schematically, a mold according to the invention is shown, for forming a collapsible container. This mold 60 comprises a first mold part 61 and a second mold part 62, as well as a core 63. In closed condition as shown in Fig. 19, the mold parts 61, 62 and core 63 define a mold cavity 64 in which a container 1 according to the invention can be injection-molded. The mold cavity 64 comprises a bottom forming part 65 and a number of sidewall forming parts 66, connected to the bottom forming parts 65 via first hinging element forming parts 67. The core 63 comprises hinging element forming parts 68 which extend into the sidewall forming parts 66, in particular into the parts forming the first sidewalls. The cross-section through the mold 60 shown in Figs. 19 – 21 is taken, for instance, at two thirds of the width of the container, the hinging element forming parts 68 being arranged for forming the third hinging elements 12, viewed in the direction of the nearest second sidewall. In this mold 60, the core 63 is provided with ejector pins 69, a central core part 70 through which the ejector pins reach, and, on opposite sides of the central core part 70, core edge parts 71 which substantially define a wall of the

sidewall forming part 66, at least for the first wall parts 4. The parts 68 are non-withdrawable. This means that without further measures, the container 1 is not detachable from the core 63. In order to prevent this drawback, the core edge parts 71 are manufactured such that they are biased at least at their free ends 72 in the direction of the ejector pins 69, at least the central core part 70. This is clearly shown in Fig. 21, wherein the free ends 72 are bent towards each other such that a withdrawable mold is obtained. This is achieved as follows.

In Fig. 20, after in the mold cavity 64 a container 1 in folded-out condition has been formed, with bottom 2 and sidewalls 4,6, the first mold part 61 is moved away from the second mold part 62. The container 1 is retained on the core 63, partly within the second mold part 62. Then, the ejector pins 69 together with the core edge parts 71 are moved forwards by an ejector plate 73, while taking along the container 1. By moving the ejector pins 69 and the core edge parts 71 sufficiently far from the core 73, the core edge parts 71 are free to move inwards with their free ends 72, in the direction of the ejector pins 69. The core edge parts 71 can, for instance, be manufactured from spring steel and be biased inwardly or be pulled inwards by means of guiding pins, rod assemblies or the like. Thus, the hinging element forming parts 68 are freed from the first sidewalls 4, so that the product can be withdrawn and can be taken from the mold or can fall due to gravity when the ejector pins 69 and the core edge parts 71 are withdrawn. It is preferred that then the ejector pins 69 can move further outwards than the core edge parts 71, so that the product 1 can fall from the ejector pins 69, preferably under the influence of gravity. Then, the mold is closed again and it is ready for a container to be newly formed. In Figs. 22 – 24, a part of a comparable mold is shown, again with a first mold part 61 and a second mold part 62, moveable relative thereto. Core edge parts 71 are again provided on two opposite sides of a core 63. In this embodiment, the core 63 is fixedly connected to the second mold part 62 and the mold cavity 64 is substantially included in the first mold part 61. Again,

the mold edge parts 71 are biased in a direction facing each other, at least as far as the free edges 72 are concerned. Again, hinging element forming parts 68 are provided, for, for instance, forming first and third hinging elements.

After a product such as a container 1 has been formed in the closed position in the mold cavity 64 as shown in Fig. 22, the mold is opened by moving apart first and second mold parts 61, 62 as shown in Fig. 23. The core 63 is then pulled away between the mold edge parts 71. If the core 63, as shown in Fig. 23, has been moved away relatively far from the bottom 2 of the container 1, the free edges 72 of the cored edge parts 71 move inwards, in the inside space of the container 1, so that the hinging element forming parts 68 move from the first sidewall 4, whereupon the second mold part 62 can be moved further in the direction K, so that the core edge parts 71 are substantially released from the container 1 and, for instance, can be pulled back along the core 63. Then the container 1 can be ejected from the mold cavity 64 with the aid of ejector pins 69 provided in the first mold part 61 and the mold can be closed again for a following product.

A container 1 according to the invention can be used one time and, after use, be thrown away but is preferably reused, to which end it is used in a so-called return system. The container is, for instance, injection-molded, filled with products, sent to an (end)user, where the products are taken out and the container is folded-in. Then, the container is sent back to the original user to be checked, or to a recycling company if the container is not suitable to be reused. The recycling company grinds the container, from which, subsequently, again, a container is formed. Thus, in an optimal manner, use is made of the material available.

The invention is not limited in any manner to the exemplary embodiment represented in the drawing and the description. Many variations thereon are possible within the framework of the invention as outlined by the claims.

For instance, containers can be formed having lower longitudinal edges, while, for instance, two fourth hinging elements 26 arranged at a distance from each other can be provided with connecting third hinge lines 12. Also, in an embodiment according to Fig. 1, the second sidewall surfaces 22 can be designed such that they do not touch near the middle 16, so that relatively low sidewalls 4, 6 can be used, at least a relatively wide bottom 2. In the exemplary embodiments shown, the hinging elements 8, 10, 12, 26, 28, 34, 42, 44, 46 are provided as straight, hinge line defining elements, in the form of recesses or film hinges, for instance as shown in Figs. 17 and 18. However, also other hinging elements can be used. For instance, if the closed character of the wall structure of the container, for instance for liquid-tightness, gas-tightness, hygiene and such is not of importance, the hinging elements can consist of thin bridges of plastic material between the different sidewall surfaces 20, 21, and/or bottom surfaces 38, 40. Also, the hinging elements can for instance be designed as creases or the like. A container according to the invention can be designed both in non-transparent and transparent plastic, as well as in opaque materials. Also, 2K injection-molding techniques can be used so that different parts of the container can be designed in different materials. For instance, some hinging elements can be designed in a more flexible plastic for obtaining an even better foldability. In containers according to the invention, for instance products can be stored, but they can also be used for, for instance, granulates, powders, liquids and the like. In particular when they are manufactured from one material, the containers can be processed in a simple manner, in particular in recycling flows since a mono packaging is involved. The containers can be supplied in a folded-in condition, be set up simply by hand or with a machine and be filled while, after use, the containers can simply be brought into a folded-in flat condition for further processing, for instance, return, waste or recycling.